

Exponents and Formulas

Laws

$$2^3 \cdot 2^2 = 2^{3+2} = 2^5$$

$$\frac{x^7}{x^5} = x^{7-5} = x^2$$

$$(3^2)^3 (2^2)^4 = 3^{2 \cdot 3} 2^{2 \cdot 4} = 3^6 2^8$$

$$\frac{x^9}{x^9} = x^{9-9} = x^0 = 1$$

$$3^{-2} \Rightarrow \left(\frac{1}{3}\right)^2 \Rightarrow \frac{1^2}{3^2} = \frac{1}{3^2}$$

Substitute and Evaluate

$$x^2 y^3 \quad x=4 \quad y=-2$$

$$(4)^2 (-2)^3$$

$$16(-8)$$

$$-128$$

Jan 10-12:50 PM

Multiple-Choice Grade 9 Assessment of Mathematics, Exponents and Formulas

1. The expression below can be simplified. Which of the following shows the expression in its simplest form?

a $x^4 y$
b x^4
c xy
d $x^3 y$

2. Aisha receives \$10 000. Aisha keeps half his money and gives the rest to Bertha. Bertha keeps half her money and gives the rest to Calvin. Calvin keeps half his money and gives the rest to Dana. Dana keeps half his money and gives the rest to Evanna. Which expression shows the dollar amount of money that Evanna receives from Dana?

a $10\,000 \div 2^4$
b $5000 \times \frac{1}{2} \times \frac{1}{2}$
c $10\,000 + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$
d $2500 \div 2$

3. Expressions for the base area and volume of a prism are given below.

Volume = $64x^3 y^4$

Base area = $16x^2 y^2$

Which expression represents the height of the prism?

F $4x^2 y^2$
G $4x^2 y^3$
H $1024x^2 y^8$
J $1024x^2 y^8$

4. Meg has been asked to determine the value of the numerical expression below.

$\frac{2 \cdot 400}{2^{10}} - 2^3$

Which of the following is the value of Meg's expression?

A 1
B 2
C 4
D 8

Multiple-Choice Grade 9 Assessment of Mathematics, Exponents and Formulas

1. The expression below can be simplified. Which of the following shows the expression in its simplest form?

a $x^4 y$
b x^4
c xy
d $x^3 y$

2. Aisha receives \$10 000. Aisha keeps half his money and gives the rest to Bertha. Bertha keeps half her money and gives the rest to Calvin. Calvin keeps half his money and gives the rest to Dana. Dana keeps half his money and gives the rest to Evanna. Which expression shows the dollar amount of money that Evanna receives from Dana?

a $10\,000 \div 2^4$
b $5000 \times \frac{1}{2} \times \frac{1}{2}$
c $10\,000 + \frac{1}{2} + \frac{1}{2} + \frac{1}{2} + \frac{1}{2}$
d $2500 \div 2$

3. Expressions for the base area and volume of a prism are given below.

Volume = $64x^3 y^4$

Base area = $16x^2 y^2$

Which expression represents the height of the prism?

F $4x^2 y^2$
G $4x^2 y^3$
H $1024x^2 y^8$
J $1024x^2 y^8$

4. Meg has been asked to determine the value of the numerical expression below.

$\frac{2 \cdot 400}{2^{10}} - 2^3$

Which of the following is the value of Meg's expression?

A 1
B 2
C 4
D 8

Multiple-Choice Grade 9 Assessment of Mathematics, Exponents and Formulas

1. Which of the following fish tanks would contain an amount of water represented by the expression $l^3 - 24l^2 y$ when completely full?

A

B

C

D

2. Simplify the following algebraic expression:

$\frac{a^2 b^4}{a^3 b^2}$

F $\frac{a^2}{b^2}$
G $\frac{a^4}{b^3}$
H $a^2 b^3$
J $a^2 b^3$

3. Simplify the following expression:

$3x(2x + 3) - 5x$

a $6x^2 - 5x + 3$
b $6x^2 - 6x$
c $15x^2 - 5x$
d $6x^2 + 4x$

Multiple-Choice Grade 9 Assessment of Mathematics, Exponents and Formulas

1. Which of the following fish tanks would contain an amount of water represented by the expression $l^3 - 24l^2 y$ when completely full?

A

B

C

D

2. Simplify the following algebraic expression:

$\frac{a^2 b^4}{a^3 b^2}$

F $\frac{a^2}{b^2}$
G $\frac{a^4}{b^3}$
H $a^2 b^3$
J $a^2 b^3$

3. Simplify the following expression:

$3x(2x + 3) - 5x$

a $6x^2 - 5x + 3$
b $6x^2 - 6x$
c $15x^2 - 5x$
d $6x^2 + 4x$

Open Response

Grade 9 Assessment of Mathematics, Exponents and Formulas

13

Building Boxes

A box with a volume of $12x^3y^2$ is shown below.

$V = 12x^3y^2$

$2x$

$2y$

Hint: $V = lwh$

What is the width of the box?
Show your work.

Open Response

Grade 9 Assessment of Mathematics, Exponents and Formulas

13

Building Boxes

A box with a volume of $12x^3y^2$ is shown below.

$V = 12x^3y^2$

$2x$

$2y$

Hint: $V = lwh$

What is the width of the box?
Show your work.


Open Response

Grade 9 Assessment of Mathematics, Exponents and Formulas

14

Excellent Equation

Expand and simplify.
 $2(3x^2 - 5x) + 4x(7 + x)$
Show your work.




Open Response

Grade 9 Assessment of Mathematics, Exponents and Formulas

14

Excellent Equation

Expand and simplify.
 $2(3x^2 - 5x) + 4x(7 + x)$
Show your work.



Open Response

Grade 9 Assessment of Mathematics, Exponents and Formulas

15

Water Reservoir

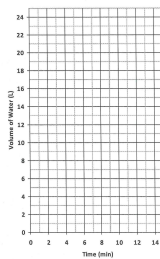
The volume of water left in a reservoir as it empties is shown by the formula below, where V is the volume of the water, in Litres, and t is the time in minutes.

$$V = 20 - \frac{3t}{2}$$

Complete the table of values below and plot the points on the grid provided.
Show your work.

| Time (t) | Volume of Water (V) |
|----------|---------------------|
| | 17 |
| | 11 |
| | 5 |
| | 2 |

Volume of Water over Time



Open Response

Grade 9 Assessment of Mathematics, Exponents and Formulas

15

Water Reservoir

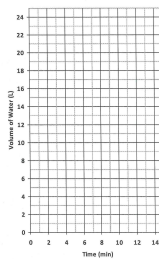
The volume of water left in a reservoir as it empties is shown by the formula below, where V is the volume of the water, in Litres, and t is the time in minutes.

$$V = 20 - \frac{3t}{2}$$

Complete the table of values below and plot the points on the grid provided.
Show your work.

| Time (t) | Volume of Water (V) |
|----------|---------------------|
| | 17 |
| | 11 |
| | 5 |
| | 2 |

Volume of Water over Time



Open Response

Grade 9 Assessment of Mathematics, Exponents and Formulas

13

Evaluating an Expression

Evaluate the following expression.
$$\frac{(2^3)^{10} \times 2^{10} \times 3^3}{(2^3)^{10}}$$

Show your work.

Open Response

Grade 9 Assessment of Mathematics, Exponents and Formulas

13

Evaluating an Expression

Evaluate the following expression.
$$\frac{(2^3)^{10} \times 2^{10} \times 3^3}{(2^3)^{10}}$$

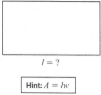
Show your work.

Multiple-Choice

Grade 9 Assessment of Mathematics, Exponents and Formulas

11

The area of the rectangle shown below is $6xy^2$ square units.



If the width is $3x$ units, which expression represents the length of the rectangle?

a $2xy^2$ units


b $2y^2$ units

c $3xy^2$ units

d $3y^2$ units

12

Each side of a cube is $2y$ cm long. is the volume of the cube?



a $8y^3$ cm³


b $6y$ cm³

c $2y^3$ cm³

d $2y$ cm³

14

While experimenting with a toy rocket, Dan determines that he can model the rocket's height, h , in metres, with respect to time, t , in seconds, using the equation $h = \frac{1}{2}t^2$



Which calculation correctly finds the value of h when $t = 10$?

a $h = \frac{1}{2} \times 10^2$
 $= 5^2$
 $= 25$

b $h = \frac{1}{2} \times 10^2$
 $= \frac{1}{2} \times 20$
 $= 10$

c $h = \frac{1}{2} \times 10^2$
 $= \frac{1}{2} \times 100$
 $= 50$

d $h = \frac{1}{2} \times 10^2$
 $= \frac{1}{2} \times 100$
 $= 35$

15

Simplify the expression $(-3x)^2$.

a $-3x^2$

b $6x^2$

c $-9x^2$


d $9x^2$

Multiple-Choice

Grade 9 Assessment of Mathematics, Exponents and Formulas

11

The area of the rectangle shown below is $6xy^2$ square units.



If the width is $3x$ units, which expression represents the length of the rectangle?

a $2xy^2$ units


b $2y^2$ units

c $3xy^2$ units

d $3y^2$ units

12

Each side of a cube is $2y$ cm long. is the volume of the cube?



a $8y^3$ cm³


b $6y$ cm³

c $2y^3$ cm³

d $2y$ cm³

14

While experimenting with a toy rocket, Dan determines that he can model the rocket's height, h , in metres, with respect to time, t , in seconds, using the equation $h = \frac{1}{2}t^2$



Which calculation correctly finds the value of h when $t = 10$?

a $h = \frac{1}{2} \times 10^2$
 $= 5^2$
 $= 25$

b $h = \frac{1}{2} \times 10^2$
 $= \frac{1}{2} \times 20$
 $= 10$

c $h = \frac{1}{2} \times 10^2$
 $= \frac{1}{2} \times 100$
 $= 50$

d $h = \frac{1}{2} \times 10^2$
 $= \frac{1}{2} \times 100$
 $= 35$

15

Simplify the expression $(-3x)^2$.

a $-3x^2$

b $6x^2$

c $-9x^2$


d $9x^2$


Multiple-Choice


Grade 9 Assessment of Mathematics, Exponents and Formulas

16

Sylvie folds a large piece of paper in half. The fold divides the paper into two equal parts. She folds it in half again. When she unfolds it, the folds divide the paper into four equal parts.


1 fold, 2 parts


2 folds, 4 parts


3 folds, 8 parts

She continues to fold and unfold the paper until the folds divide the paper into 64 equal parts.

How many times altogether has Sylvie folded the paper?

F 5 times

G 6 times

H 7 times

J 8 times

17

Tim shows the steps he took in simplifying the following algebraic expression:
$$\frac{(a^2b)^2}{a^2 \times a^2}$$

Step 1
 $= \frac{a^4b^2}{a^2 \times a^2}$

Step 2
 $= \frac{a^4}{a^4}$

Step 3
 $= \frac{a^4}{a^4}$

Step 4
 $= 1$

In which step did Tim make an error?

F Step 1

G Step 2

H Step 3

J Step 4

18

Simplify fully:
 $-5x(4 - 3x) + 2x^2$

a $2x^2 - 17x$

b $2x^2 - 23x$

c $17x^2 - 5x$

d $17x^2 - 20x$


STOP


Multiple-Choice


Grade 9 Assessment of Mathematics, Exponents and Formulas

16

Sylvie folds a large piece of paper in half. The fold divides the paper into two equal parts. She folds it in half again. When she unfolds it, the folds divide the paper into four equal parts.


1 fold, 2 parts


2 folds, 4 parts


3 folds, 8 parts

She continues to fold and unfold the paper until the folds divide the paper into 64 equal parts.

How many times altogether has Sylvie folded the paper?

F 5 times

G 6 times

H 7 times

J 8 times

17

Tim shows the steps he took in simplifying the following algebraic expression:
$$\frac{(a^2b)^2}{a^2 \times a^2}$$

Step 1
 $= \frac{a^4b^2}{a^2 \times a^2}$

Step 2
 $= \frac{a^4}{a^4}$

Step 3
 $= \frac{a^4}{a^4}$

Step 4
 $= 1$

In which step did Tim make an error?

F Step 1

G Step 2

H Step 3

J Step 4

18

Simplify fully:
 $-5x(4 - 3x) + 2x^2$

a $2x^2 - 17x$

b $2x^2 - 23x$

c $17x^2 - 5x$

d $17x^2 - 20x$

STOP